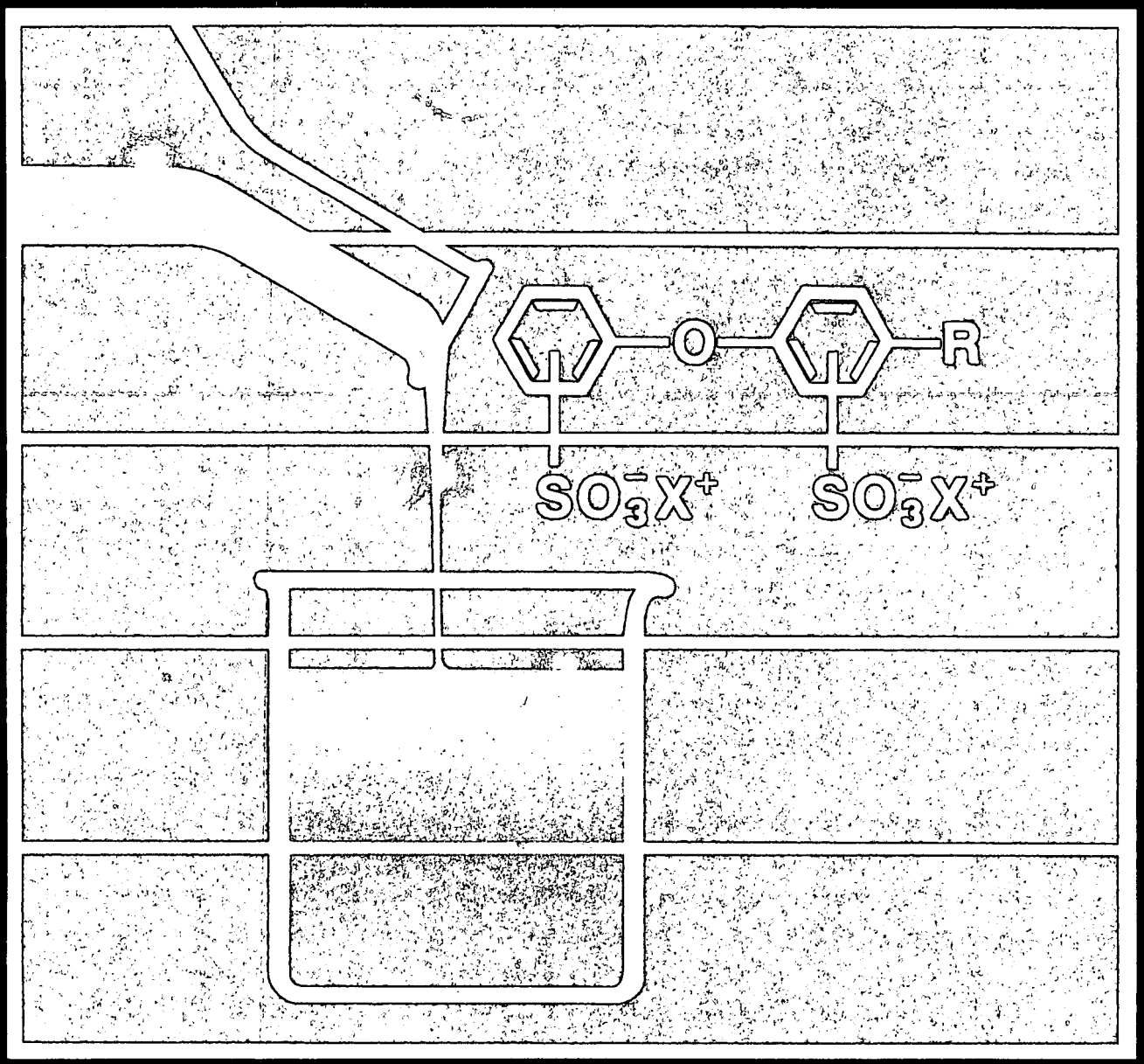
DOW

EXHIBIT 7

DOWFAX Surfactants

High Performance Anionic Surfactants



For Improved Efficiency and Effectiveness

Agriculture — Cleaning — Latexes — Petroleum — Textiles

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DOWFAX* Surfactants
For Improved Efficiency and Effectiveness

Foreword

DOWFAX alkylated diphenyl oxide **disulfonates** are a family of highly anionic, surface active agents. Their commercial utility is based on unusually high solubility, excellent stability, coupling ability, and surface activity in concentrated aqueous solutions of acids, alkalies, and salts.

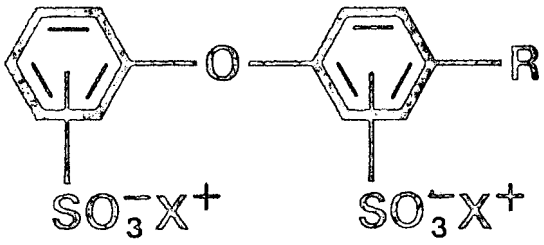
They consistently provide practical answers to formulation problems in a variety of applications —

- agriculture
- cleaning
- detergents
- emulsion polymerization
- mining
- petroleum
- textiles

— often where other surfactants have failed. When used as a replacement for or in combination with other surfactants, DOWFAX surfactants can improve efficiency and effectiveness.

The basis for these claims of good performance begins with the molecule of DOWFAX surfactant — unique in the surfactant industry because of the **disulfonated** structure.

This bulletin discusses the use, value, advantages, toxicity, handling characteristics, etc. of DOWFAX surfactants. Other information you may require about DOWFAX surfactants or about other applications is readily available from your Dow sales representative or the nearest Dow sales office.



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Product Introduction

Currently, there are several DOWFAX surfactants offered as sales products. See Table 1. Check with your Dow salesman to be certain you have an up-to-date, complete listing.

Different alkyl hydrophobes can be attached to the diphenyl oxide backbone. Variations also can be made in the degree of sulfonation and alkylation, and different salts (ammonium, amine, potassium, calcium, magnesium, etc.) can be produced. Thus, the three high performance DOWFAX surfactants can be modified to meet the specific needs of customers.

A number of experimental surfactants also are available from Dow, some in commercial quantities. Selected examples are shown in Table 2. Contact your Dow sales or technical service representative for further information.

Table 1 — Commercial DOWFAX Surfactants

Surfactant	Hydrophobe (R)	Salt (X^+)	% Active
DOWFAX 2A0	C_{12} Branched	Acid	40
DOWFAX 2A1	C_{12} Branched	Sodium (salt) of 2A0)	45
DOWFAX 3B0	C_{10} Linear	Acid	40
DOWFAX 3B2	C_{10} Linear	Sodium	45

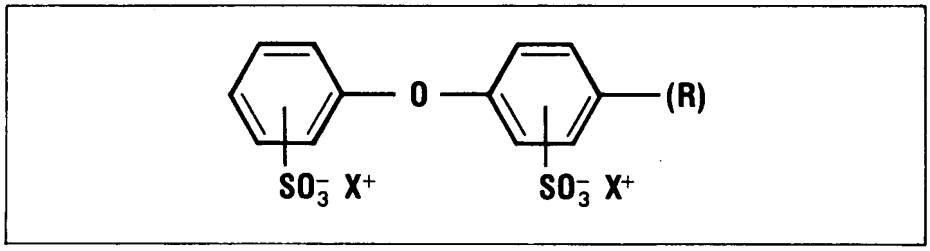

Table 2 — Experimental Surfactants

Experimental Surfactant	Hydrophobe (R)	Salt (X^+)
XDS 30237.00	C_{12} Branched	Sodium[1]
XDS 8390.00	C_{16} Linear	Sodium

[1] Low salt, polymerization grade.

Note — Experimental products are in various stages of market development. Dow reserves the right to change specifications, properties, and/or production schedules.

Stability Performance

In Caustic Soda

Tests conducted with 10 percent and 20 percent solutions of caustic soda show DOWFAX 2A1 surfactant to have excellent stability.

A one percent solution of DOWFAX 2A1 surfactant in ten percent caustic was heated to 302°F (150°C). The solutions were sampled periodically and their wetting time and surface tension recorded. The data are shown in Table 9.

Table 9 — Stability of DOWFAX 2A1 Surfactant in 10% NaOH

Time (hr)	Wetting Time (min)	Surface Tension (dynes/cm)
0	1.12	40
24	1.22	37
48	1.02	37
120	1.02	37
188	0.94	35

In Acid

DOWFAX surfactants exhibit good acid stability. For example, a solution of 16% hydrochloric acid, 5% iron (as $FeCl_2$), and 0.1% DOWFAX 2A1 surfactant was heated to 60°C (140°F). Over a one-week time period, this solution remained perfectly clear and stable. Note: Solubility/stability data of DOWFAX 2A1 in oxidizing inorganic acids (e.g., HNO_3, H_2SO_4) are shown in the next section.

The DOWFAX surfactants also are stable in organic acid (e.g., sulfamic and oxalic) formulations. For example, a 20% sulfamic acid solution containing 0.1% DOWFAX 2A1 was heated for three weeks at 53°C (125°F). Before heating, the surface tension was 35.0 dynes/cm. After heating, the surface tension was 32.7 dynes/cm, evidence of the excellent stability of DOWFAX.

In higher strength acids (e.g., 28% HCl), DOWFAX 3B2 surfactant and Experimental Surfactant XDS 8390.00 are recommended because of their maximum solubility.

In Bleach (Oxidation Resistance)

DOWFAX 2A1 surfactant has excellent oxidative stability. It was tested by dissolving in a number of oxidizing agents at different concentrations and storing them for extended periods of time. Testing was done at both room temperature and 122°F (50°C).

Evidence of oxidation was based on discoloration or other changes in the appearance of the solution, on a decrease in loss of foaming power, and on surface tension data. The results indicate that at room temperature, DOWFAX 2A1 surfactant is unaffected by contact with all but the very strongest oxidizing agents. At 122°F (50°C), the strongest agents have some effect after a few hours. Tables 10 and 11 (pages 7 and 8) summarize the test results.

Comparisons of data obtained in these tests with tables of standard oxidation potentials indicate that DOWFAX 2A1 surfactant will withstand an electromotive potential (E) of approximately one volt. Of the oxidizing agents tested, three have a potential exceeding this value:

98% Sulfuric Acid	E = − 1.5 volts
70% Nitric Acid	E = − 1.2 volts
20% Chromic Acid	E = − 1.4 volts

Tests performed under more severe conditions indicate no changes in the surface active properties of DOWFAX 2A1 after 24 hours in 20 percent nitric acid on a steam-plate.

Other studies evaluating DOWFAX 2A1 and selected commercial surfactants were done with hypochlorite bleach. Formulations were made containing 0.75% sodium hypochlorite, 1.5% active surfactant, 2.8% trisodium phosphate (as an alkaline builder) and 94.95% water. Accelerated aging tests of these formulations were done at 50°C (122°F). The time it took for half of the hypochlorite bleach to decompose (bleach "half-life") was determined by an iodometric titration procedure. The data are shown in Table 12, page 8.